

WIRELESS CONTROLLED ROBOT

Project report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

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ENGINEERING

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DECLARATION BY THE SCHOLAR

We hereby declare that the work presented in the dissertation for B-Tech entitled **“WIRELESS CONTROLLED ROBOT”** is an authentic record of my work carried out under the supervision of **“Prof. Emjee Puthooran (Electronics and Communication).”** I have not submitted this work elsewhere for any other degree or diploma.

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1. INTRODUCTION

1.1. INTRODUCTION:

Mobile robot are those type of robot which can move one place to another place across the ground. Mobility gives a robot a much more flexibility to perform new, complex and more exciting task. Robots with mobility can execute more natural asks in which environment is no designed especially. These robots can work in human-centered space and work together with men by involvement a workspace together.

Nowadays, robots are increasingly rapidly being incorporated into working asks with the respect of humans especially to respective asks. The mobile robots are presently used in many fields of applications such as office, military asks, hospital operations, industry, environment and agriculture. Mobile robots also very useful in dangerous work such as welding (dangerous for human because of toxic gases), painting, assembly operation problem etc.

Therefore, locomotion robot can supplant individuals to do work. The robot is remote controlled to ensure it can be utilized a long way from the operator. This project demonstrates to execute mobile robot system by the interface the Raspberry Pi (microcomputer) by utilizing serial port. The microcomputer is programmed in python language, the mobile contain camera, motor, infrared sensor.

1.2 MOTIVATION:

The main motivation in pursuing the project was to gain experience over Raspberry Pi system. The object detection robot is widely used in machine vision industry (such as inspection, registration and manipulated tasks). The application of obstacles avoidance vehicle robot in especially military purpose. A huge loss can happen in adversary areas because of human errors. The solution is to get use of advanced technology developed over the years, robot with help of robot-vision algorithms can observe the location of interest and make proper intimations or actions in time. A huge advantage comes in saving our

soldiers or workforce from disaster. Robots with high resolution cameras can monitor over long distance and larger areas.

It is cool to add a camera to your remote controlled auto or robot with the goal that you can see where it's heading precisely and presumably utilize a wifi empowered cell phone or tablet to see the video also. It's exceptionally straight forward now to do his utilizing a raspberry pi and a USB webcam.

With such ideas in your mind, we begin working on this can be profitable for surveillance and following in clean situations, and in computerization system. Additionally building such an making project utilizing Raspberry Pi and Pi Cam is economical. As if there are such security cams accessible in advertise however they are excessively costly and our robot is mobile and remote or wireless controlled.

1.3 LITERATURE SURVEY

As in, a remote sensor organize is a framework combination of radio recurrence (RF) handsets, microcontrollers, sensors and power supply source. Wireless sensor systems with self-arranging, self-designing, self-diagnosing and self-healing abilities have been produced to conquer problems or to allow applications that traditional innovations couldn't solve. Wireless sensor network comprises of different sensors. In, Wireless correspondence the exchange of data over a separation without the utilization of electrical conductors. The separations included might be short or long. Wireless communication includes - Radio frequency communication, Microwave communication, Infrared (IR) short - range communication. Utilizations of this communication may include point - to - point communication, point - to - multipoint communication, broadcasting, cell systems and remote systems. Over the most recent couple of years, the wireless interchanges industry experienced extraordinary changes driven by many innovation developments. There are a few system that enable information to be remotely accessed. As an answer for wireless information gathering through the internet, Wi-Fi on Raspberry Pi is a well known decision in a few applications. Real-time system correctness relies upon the accuracy of the

intelligent consequence of the calculation and in addition on the outcome conveyance time. The system running on the Linux working OS and is popular choice for some inserted PC systems. Clients can control the remote information and remote framework by utilizing the web server. The old arrangement of transmitting the information by utilizing the ordinary user server system isn't so helpful as it requires extensive measure of memory, it require more space for the general setup. Hence the cost of old system increments thus it is unsuitable, not all that dependable. Consequently the old system with central server can be supplanted with the assistance of this advanced embedded web server. Every one of the sensors sense the particular information in the arrangement and send his information towards the controlling unit, for example, ARM8 (16). Subsequently every one of the information is gathered by the ARM8 and is kept up at this area. Here the information is put away in the information base. A this stage signal molding is done and just required measure of information is sent forward. Along these lines an effective correspondence is accomplished between a server and customer side by utilizing this kind of system. From remote handling unit the PC will ceaselessly screen every one of the information and contrast and the esteem preloaded process structure. In, along these lines revealing of his constant information relating to the procedure plants can accordingly be of incredible use for future analysis.

2. PLANNING&DESIGN:

2.1 PLANNING:

- First of all, we choose Raspberry pi over Aurdino because we run many many program at a time.
- Setup all components all chasis of robot according to design that's describe below.
- Program in Raspberry pi to move in any direction and obstacle detect in following path.
- Setup webcam to record wide view around the robot.

Now this is the final term of this project and we have done the work that it moves in any direction but also sense the object if there is and change the path.

In this robot we have also done the webcasting that will give the live surroundings of this robot.

2.2 DESIGN:

Basic Circuit Diagram

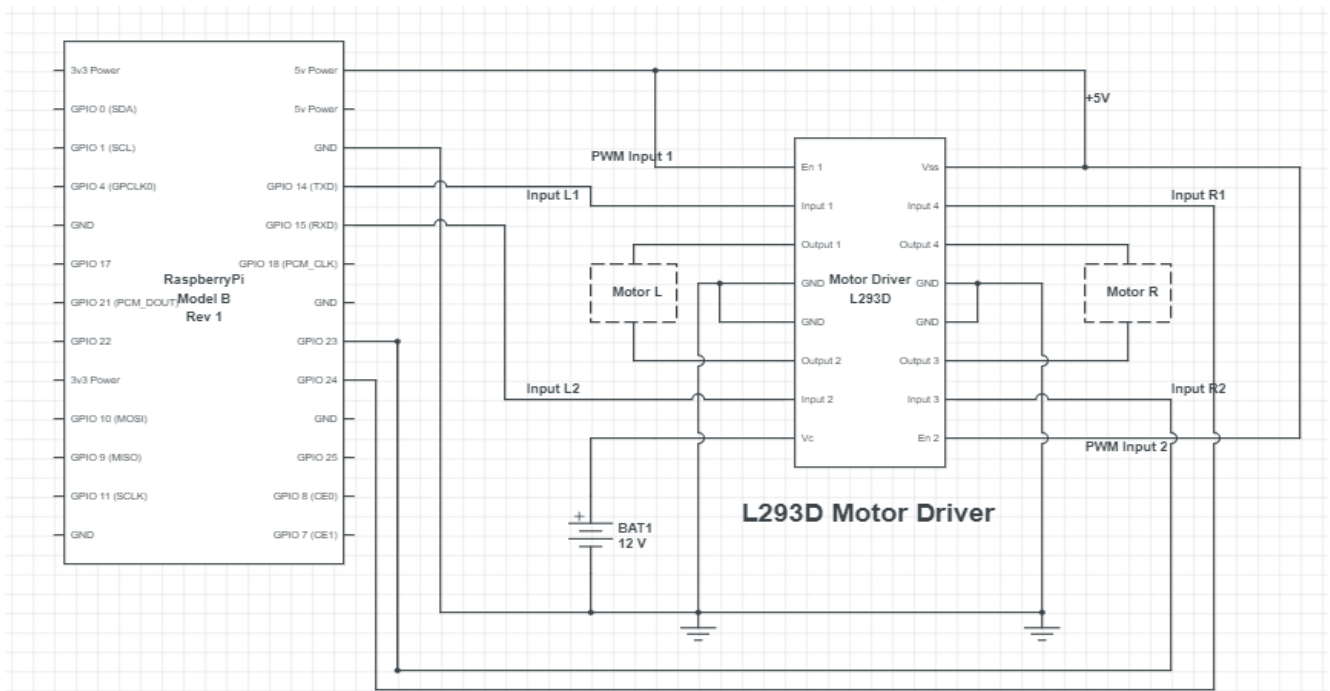
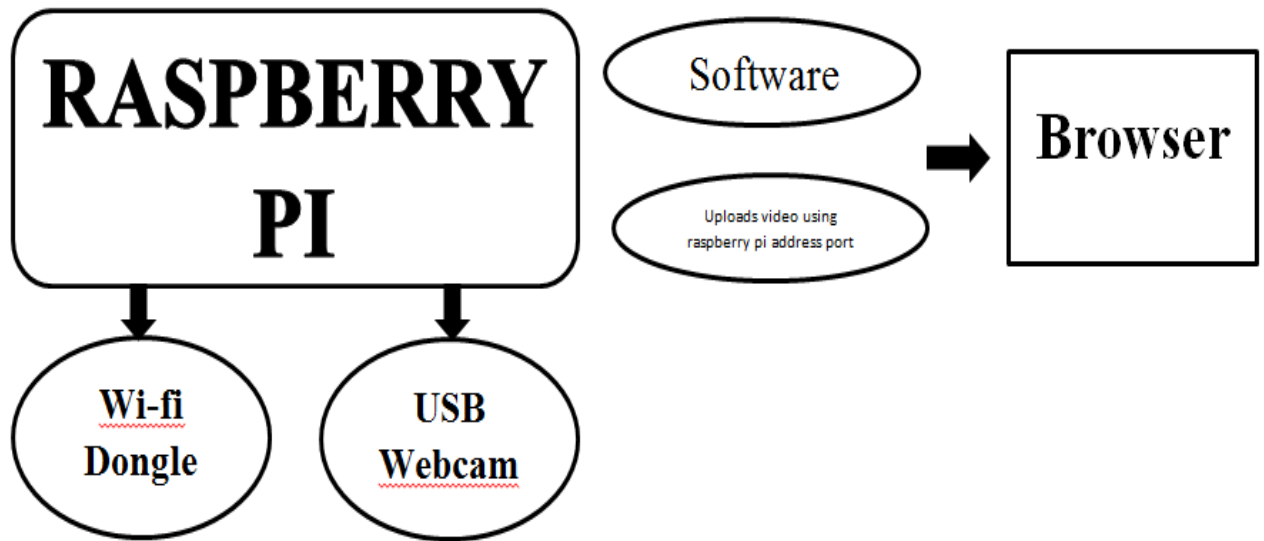


Fig 2.1 – Circuit Diagram of our project (motor driver connected to raspberry pi)

We need raspberry pi board, L293D, servo-motor , battery, connecting wires for the this connection as shown in circuit diagram. Here we see that, the connection of servo-motors with motor driver (L293D) and motor driver is connected to the GPIO pins of raspberry pi board.



Fif 2.2 – Webcam Design

Connecting and checking the USB camera-to check if your webcam is getting recognized in the raspberry pi and whether its encourage can be seen. The video from the raspberry pi is communicated on the local network. Any gadget on this system can see the video from the webcam.

3. SYSTEM REQUIREMENT

3.1: Hardware:

3.1.1- RASPBERRY PI:

To interface the mobile robot to the Internet and the establishment of the different projects, we should an install Raspbian OS (operating system) and can be extended up to 256 GB limit SD card. In this card interesting class X SD card of limit 16 GB which embedded in miniaturized scale SD card space.

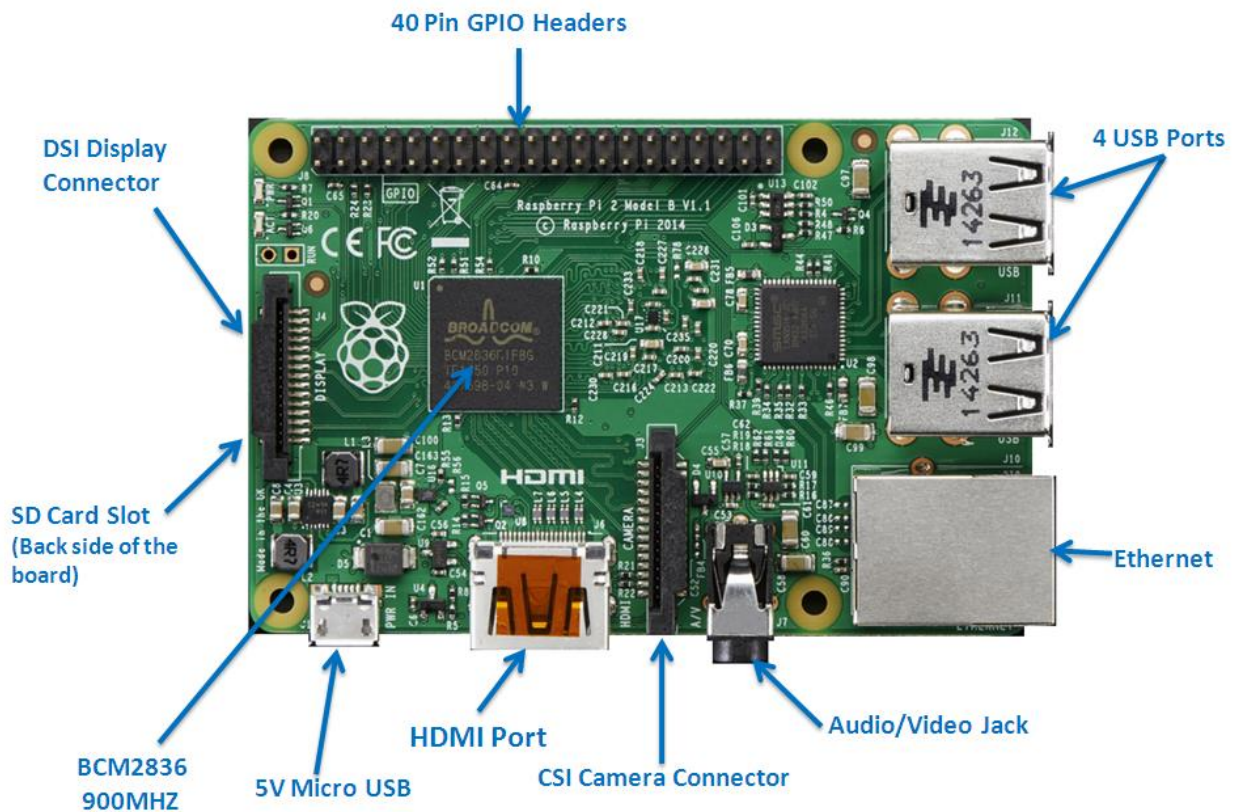


Fig3.1 - Raspberry pi-3 Model B

http://jayx.co.nz/JXblog/wp-content/uploads/2016/01/Raspberry_pi_2_2.png

Description of the components on the Pi:

Processor / SoC (System on Chip):

The Raspberry Pi has a Broadcom BCM2836 System on Chip module. It has aARM1176JZF-S processor.

Power source:

The Raspberry Pi is a gadget which expends 2A-2.5A or 5W or power. It is control driven by a Micro USB charger or the GPIO header. Any virtuous cell phone charger will take the necessary steps of powering the Raspberry Pi.

SD Card:

The Raspberry Pi does not have any included storage accessible. The working framework is stacked on a SD card which is injected on the SD card opening on the Raspberry Pi. The working framework can be stacked on the card by means of a card reader on any PC.

GPIO:

GPIO – General Purpose Input Output

General Purpose Input Output General-purpose input/output (GPIO) is a non-selective pin on an incorporated circuit whose conduct, including whether it is a data or output pin, can be controlled by the customer or client at run time. GPIO pins have no specific reason characterized, and go unused as a default. The thought is that occasionally the framework creator constructing a full framework that uses the chip may think that its valuable to have a additional bunch of extra advanced control lines, and having these accessible from the chip can save the issue of arranging extra hardware to provide them.

GPIO abilities may include:

- GPIO pins can be designed to be input/output
- GPIO pins can be enabled/disabled
- Input values are readable(high=1, low=0)
- Output values are writable/readable

DSI Connector:

The Display Serial Interface (DSI) is a detail by the Mobile Industry Processor Interface (MIPI) Alliance went for decreasing the cost of show controllers in a cell phone. It is normally focused at LCD and comparative show innovations. It characterizes a serial

transport and a communication protocol between the host (source of the image data) and the gadget (goal of the picture information). A DSI good LCD screen can be associated through the DSI connector, despite the fact that it might require extra drivers to drive the show.

RCA Video:

RCA Video output (PAL and NTSC) are accessible on all models of Raspberry Pi. Any TV or screen with a RCA jack can be associated with the Raspberry Pi.

Audio Jack:

A standard 3.5 mm TRS connector is accessible on the Raspberry Pi for stereo audio output. Any earphone or 3.5mm sound cable can be associated straightforwardly. In spite of the fact that this jack can't be utilized for taking sound information, USB mics or USB sound cards can be used.

USB 2.0 Port:

USB 2.0 ports are the way to connect accessories, for example, mouse or console to the Raspberry Pi. There is 1 port on Model A, 2 on Model B and 4 on Model B+. The quantity of ports can be expanded by utilizing an outer controlled USB hub which is accessible as a standard Pi accessory.

Ethernet:

Ethernet port is accessible on Model B and B+. It can be associated with a system or web utilizing a standard LAN link on the Ethernet port. The Ethernet ports are controlled by Microchip LAN9512 LAN controller chip.

CSI connector:

CSI – Camera Serial Interface is a serial interface outlined by MIPI (Mobile Industry Processor Interface) partnership went for interfacing computerized cameras with a versatile processor.

The Raspberry Pi establishment gives a camera specially made to the Pi which can be associated with the Pi utilizing the CSI connector.

HDMI:

HDMI – High Definition Multimedia Interface

HDMI a type A port is provided on the Raspberry Pi to connect with HDMI screens.

3.1.2 INFRARED SENSOR:

Infrared innovation tends to a wide variety of wireless applications. The primary regions are detecting and remote controls. In the electromagnetic range, the infrared segment is isolated into three category: close infrared area, mid infrared region and far infrared region.

The wavelengths of these regions and their applications are demonstrated as follows

- Near infrared region — 700 nm to 1400 nm — IR sensors, fiber optic
- Mid infrared region — 1400 nm to 3000 nm — Heat detecting
- Far infrared region — 3000 nm to 1 mm — Thermal imaging

The frequency range of infrared is greater than than microwave and lesser than noticeable light. An infrared sensor emits or detects infrared radiation to detect its environment.

The fundamental idea of an Infrared Sensor which is utilized as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of a object and the signal is received at the infrared receiver.

There are five essential components utilized as a part of a common infrared recognition framework: an infrared source, a transmission medium, optical segment, infrared source or beneficiaries and signal handling. Infrared lasers and Infrared LED's of particular wavelength can be utilized as infrared sources. The three primary sorts of media utilized for infrared transmission are vacuum, air and optical fibres. Optical gadgets are utilized to center the infrared radiation or to limit the spectral reaction.

Optical lenses made of Quartz, Germanium and Silicon are utilized to focus the infrared radiation. Infrared receivers can be photodiodes, phototransistors and so on some essential

specification of infrared receivers are photosensitivity, detectivity and noise alike power. Signal processing is finished by speakers as the output of infrared detector is minor.

TYPES OF IR SENSORS:

Infrared sensors can be passive or active. Passive infrared sensors are essentially infrared indicators. Passive infrared sensors don't utilize any infrared source and detects vitality produced by obstacle in the field of view.

Active infrared sensors comprise of two components: infrared source and infrared detector. Infrared sources incorporate a LED or infrared laser diode. Infrared detector incorporate photodiodes or phototransistors. The energy discharged by the infrared source is reflected by a obstacle and falls on the infrared detector.

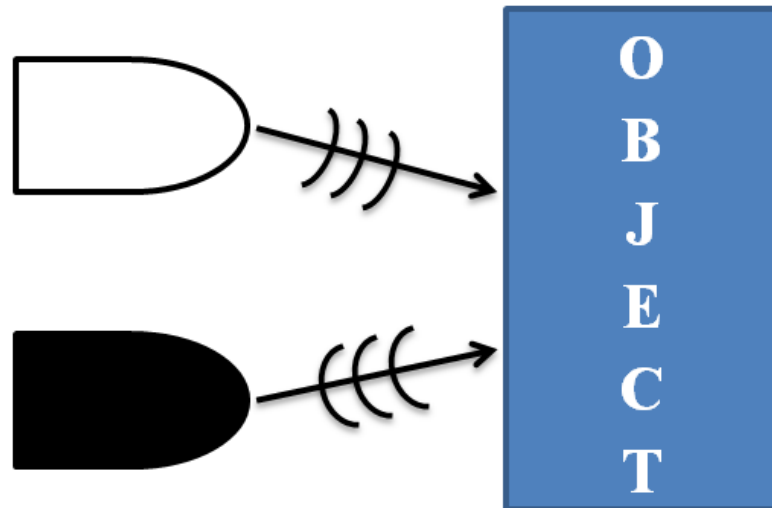


Fig3.2 – Block Diagram of obstacle detection phenomenon

IR TRANSMITTER:

Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

Infrared Transmitter is a light emitting diode (LED) which emanates infrared radiations. Subsequently, they are called IR LED's. Despite the fact that an IR LED resembles an ordinary LED, the radiation produced by it is undetectable to the human eye.

The photo of an ordinary Infrared LED is demonstrated as follows.

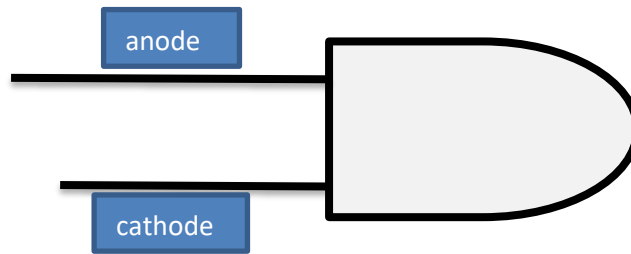


Fig 3.4 – IR Transmitter

There are different types of infrared transmitters relying upon their wavelengths, output power and reaction time.

A straightforward infrared transmitter can be built utilizing an infrared LED, a present restricting resistor and a power supply. The schematic of a commonplace IR transmitter is demonstrated as follows.

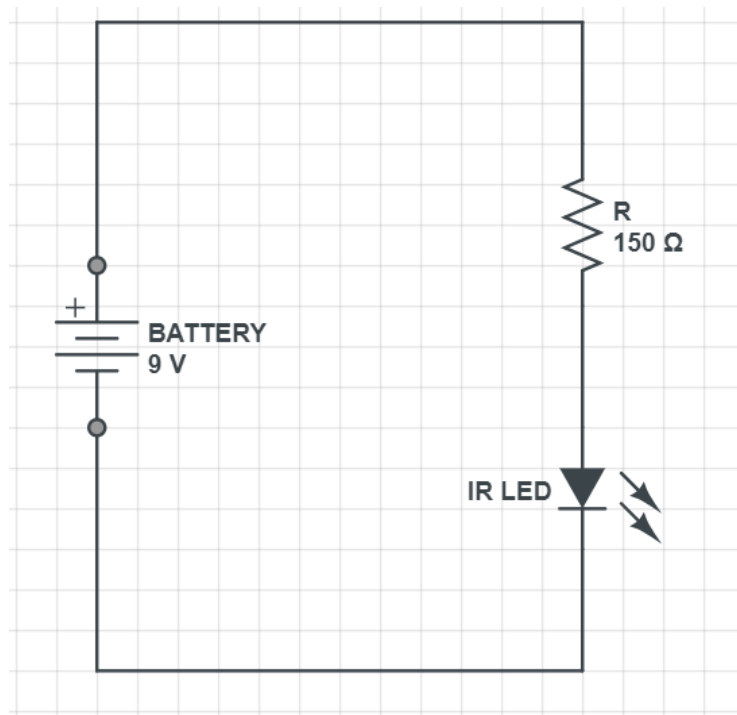


Fig 3.5 – Circuit Diagram of IR transmitter

At the point when worked at a supply of 5V, the IR transmitter consumes around 3 to 5 mA of current. Infrared transmitters can be modulated to create a particular frequency of infrared light. The most regularly utilized modulation is OOK (ON – OFF – KEYING) modulation.

IR transmitters can be found in a few applications. A few applications require infrared heat and the best infrared source is infrared transmitter. At the point when infrared producers are utilized with Quartz, sun based cells can be made.

IR RECEIVER:

Infrared receivers are likewise called as infrared sensors as they distinguish the radiation from an IR transmitter. IR collectors come as photodiodes and phototransistors. Infrared Photodiodes are not the same as should be expected photograph diodes as they identify just

infrared radiation. The photo of a regular IR receiver or a photodiode is demonstrated as follows.

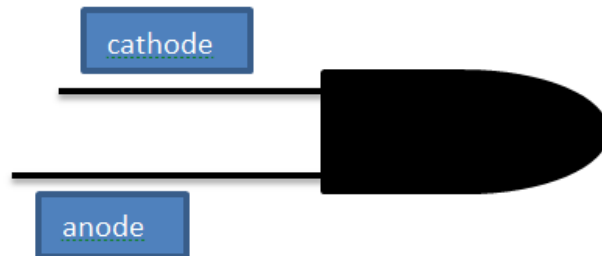


Fig 3.6 – IR Receiver

Types of IR receivers exist based on the wavelength, voltage, package, etc. When used in an infrared transmitter – receiver combination, the wavelength of the receiver should match with that of the transmitter.

Different kinds of IR receivers exist in light of the wavelength, voltage, bundle, and so forth. At the point when utilized as a part of an infrared transmitter - receiver combination, the wavelength of the recipient should coordinate with that of the transmitter.

It comprises of an IR phototransistor, a diode, a MOSFET, a potentiometer and a LED. At the point when the phototransistor gets any infrared radiation, current runs through it and MOSFET turns on. This thusly illuminates the LED which goes about as a load. The potentiometer is utilized to control the affectability of the phototransistor.

A typical infrared receiver circuit utilizing a phototransistor is demonstrated as follows.

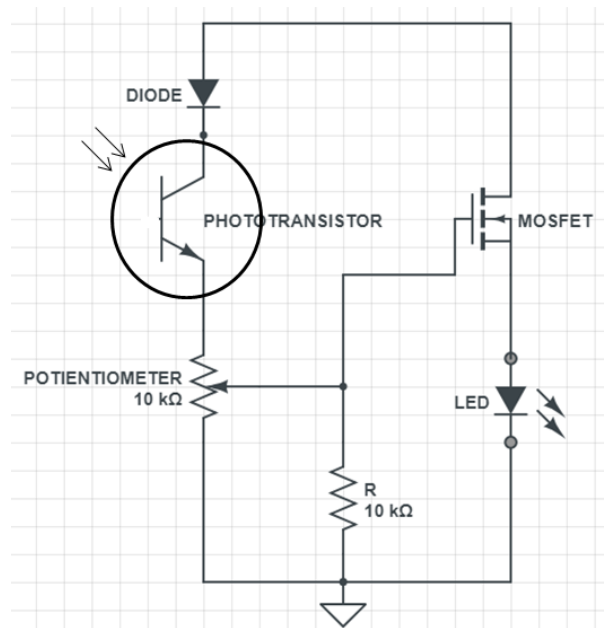


Fig. 3.7 – Circuit Diagram of IR Receiver

PRINCIPLE OF WORKING :

The role of an IR sensor filling in as an Object Detection Sensor can be clarified utilizing the accompanying figure. An IR sensor comprises of an IR LED and an IR Photodiode; together they are called as Photo – Coupler or Opto – Coupler.

At the point when the IR transmitter produces radiation, it achieves the obstacle and a portion of the radiation reflects back to the IR receiver. In view of the intensity of the reception by the IR receiver, the output of the sensor is characterized.

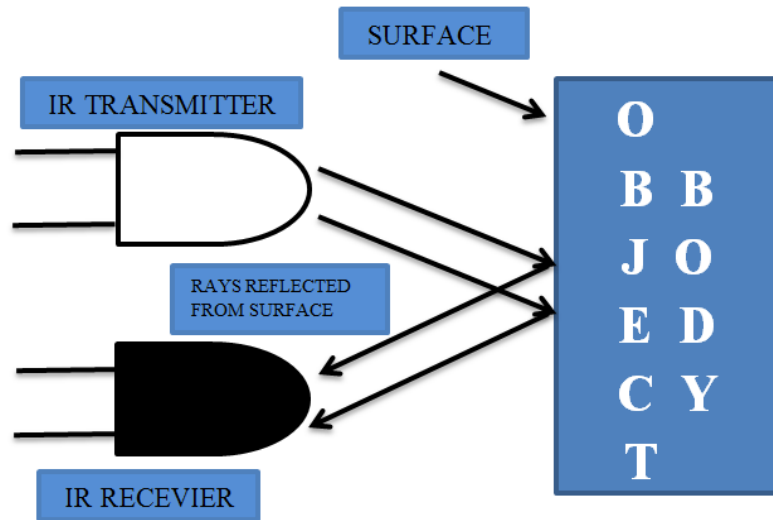


Fig3.8 – Obstacle Detection Diagram

OBSTACLE RECOGNIZING CIRCUIT (IR CIRCUIT):

The representative IR detecting circuit is demonstrated as follows. It comprises of an IR LED, a photodiode, a potentiometer, an IC Operational amplifier and a LED.

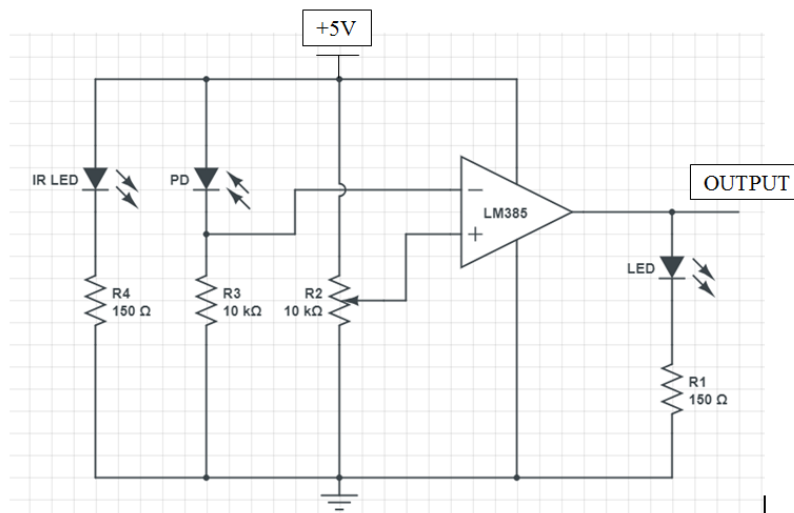


Fig 3.9 – Obstacle Detection Circuit Diagram

IR LED radiates infrared light. The Photodiode distinguishes the infrared light. An IC Op – Amp is utilized as a voltage comparator. The potentiometer is utilized to adjust the output of the sensor as indicated by the prerequisite.

At the point when the light radiated by the IR LED is occurrence on the photodiode after hitting a question, the resistance of the photodiode tumbles down from a large value. One of the input of the op - amp is at threshold value fixed by the potentiometer. The other input to the op - amp is from the photodiode's series resistor. At the point when the incident radiation is more on the photodiode, the voltage drop over the series resistor will be high. In the IC, both the threshold voltage and the voltage over the series resistor are looked at. In the event that the voltage over the resistor series to photodiode is more significant than that of the threshold voltage, the output of the IC Op - Amp is high. As the output of the IC is associated with a LED, it helps up. The threshold voltage can be balanced by altering the potentiometer relying upon the natural conditions.

The situating of the IR LED and the IR Receiver is an main factor. At the point when the IR LED is held straightforwardly before the IR recipient, this setup is called Direct Incidence. For this situation, nearly the whole radiation from the IR LED will fall on the IR receiver. Henceforth there is an observable pathway correspondence between the infrared transmitter and the receiver. In the process that a obstacle falls in this line, it discourages the radiation from achieving the recipient either by reflecting the radiation or absorbing the radiation.

3.1.3 SERVO MOTOR:

A servo engine is an electrical gadget which can push or pivot an object with extraordinary exactness. On the off chance that you need to pivot and obstacle at some particular angles and space at that point you utilize servo engine. It is simply comprised of straightforward engine which gone through servo mechanism. In the even that engine is utilized is DC powered then it is called DC servo engine, and on the off chance that it is AC controlled engine then it is called AC servo engine. We can get a high torque servo engine in at little and light weight bundles. Doe to these highlights they are being utilized

as a part of numerous applications like toy auto, RC helicopters and planes, Robotics, Machine and so on. The situation of a servo engine is chosen by electrical pulse and its hardware is set adjacent to the engine.

SERVO MECHANISM:

It is made up of three parts:

1. Controlled device
2. Output sensor
3. Feedback system

It is a close circle framework where it utilizes positive feedback system to control movement and last position of the shaft. Here the gadget is controlled by a feedback signal created by looking at output signal and reference input signal.

Here reference input signal is contrasted with reference output signal and the third signal is created by feedback system. What's more, this third signal goes about as information signal to control gadget. This signal is available as long as feedback signal is produced or there is contrast between reference input signal and reference output signal. So the principle assignment of servo-mechanism is to keep up output of a structure a wanted an incentive a nearness of noises.

Working principle of Servo Motors:

A servo comprises of a Motor (DC or AC), a potentiometer, equip get together and a controlling circuit. As a matter of first importance we utilize equip gathering to lessen RPM and to build torque of engine. Say a beginning position of servo engine shaft, the situation of the potentiometer handle is with the end goal that here is no electrical signal produced at the output port of the potentiometer. Presently an electrical signal is given to another info terminal of the mistake detection amplifier. Presently distinction between these two signal, one originates from potentiometer and another originates from to her source, will be prepared in input system and output will be given in term of error signal. This mistake signal goes about as the contribution for engine and engine begins pivoting.

Presently engine shaft is associated with potentiometer and as engine pivots so the potentiometer and it will produce a signal. So as the potentiometers angular position changes, its output feedback signal changes. After a some point the situation of potentiometer comes to a position that the output of potentiometer is same as output signal gave. A this condition, here will be no output motion from the amplifier to the engine contribution as there is no difference between external applied signal and the signal produced a potentiometer, and in this circumstance engine quits turning.

3.1.4 L293D MOTOR DRIVER:

To control the DC engines in our proposed framework we require L293D double H-connect engine driver. These H-bridge motor drives takes low present as information and conveys high present as output consequently going about as present amplifier. The high current signs drives the motor. Two inbuilt H – bridge driver circuits in L293D will drive the motor. Synchronous activities like front and back direction can be driven by DC engines in its normal mode task. L293D has input logic controlled pins at 2, 7, 10 and 15. These information rationale pins, controls the DC engines. The Associated driver gets empowered when the empower inputs are high. The DC motor begin working themselves when enable pins are high. Motor are required for the development of Robot it gives movement and mobility for the robot to push forward, in reverse and even side turns should be possible.

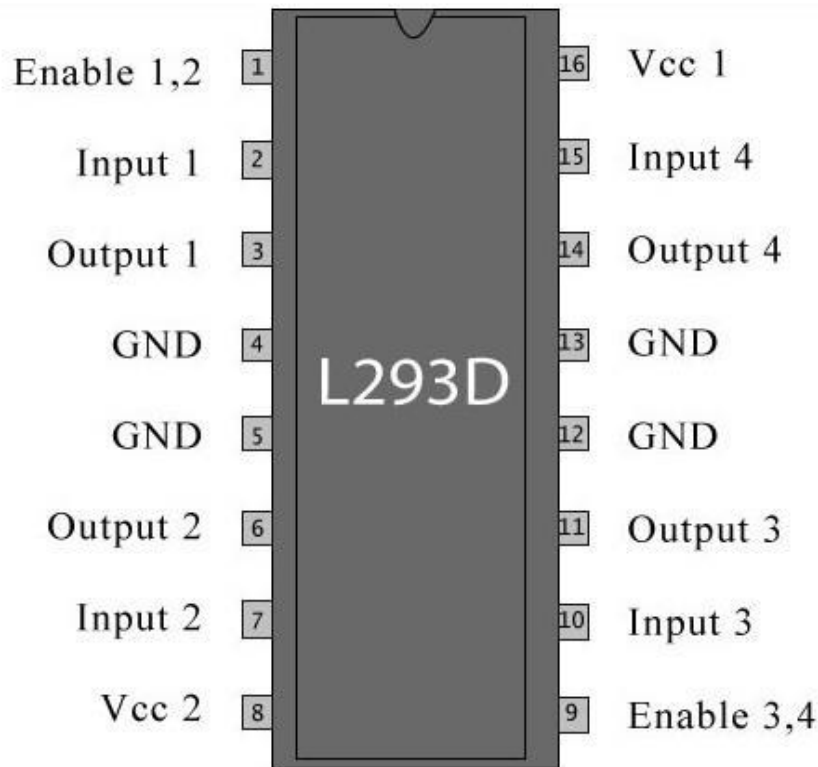


Fig. 3.10 - L293D H bridge Motor driver IC

<https://potentiallabs.com/cart/l293d-ic>

We can't interface the motor straightforwardly to the raspberry pi as it gives the less measure of current to drive the engine. So engines are associated through raspberry pi. The motor requires high measure of current for starting a movement. The engines we utilized are complete motive force systems which are effortlessly mounted and designed. The reduction gear and set of electrical motor helps in simple establishment and programming of the robot. This spares cost and decreases the complexities in planning the automated system for development.

3.1.5 WEBCAME :

It is used as capture the live video while moving and con rolled through raspberry pi.

3.2 SOFTWARE

3.2.1 PuTTY:

PuTTY is free emulator in which write open-source code as requirement, serial console and system record interchange application. Its maintenances a few system conventions, including SCP, SSH, Telnet, rlogin, and raw attachment association. It can also connect with the serial port.

PuTTY supports numerous variations from the safe remote terminal, and gives client control over the SSH encryption key and protocol type, alternate ciphers. The system correspondence layer support IPv6, and the SSH protocol supports the zlib@openssh.com postponed pressure conspire. It can also be utilized with neighborhood serial port connections.

PuTTY comes packaged with command - line SCP and SFTP customers, say "pscp" and "psftp" individually, and plink, a command - line association apparatus, utilized for non-interactive sessions.

4. IMPLEMENTATION

4.1 HARDWARE:

4.1.1 ADDING THE RASPBERRY PI TO THE ROBOT CHASSIS:

We now have the robot body fabricated and Raspberry Pi arranged with the goal that we can interface with it over the system; its presently time to assemble the together. The Raspberry Pi can be introduced anyplace on the case. The key things to consider are the length the link from the GPIO to the breadboard. In the robot vehicle demonstrated the Raspberry Pi is at the front (or if nothing else what I assigned as the front) so it could utilize the standard links. On the off chance that we would rather introduce it somewhere else then you may need to get longer links. There are two openings on the Raspberry Pi board that be utilized to secure it utilizing the PCB stands provided with the robot chassis.

4.1.2 POWER FOR THE RASPBERRY PI AND MOTORS:

The Raspberry Pi needs a power supply of 5V. This is the standard supply from a USB attachment and for the power utilized for most present day cell phones. The resistance of the supply is $\pm 0.25V$ which implies that the power supply should be between 4.75V and 5.25V. On the off chance that the supply falls lower 4.75V then it is probably going to have issues, normally the USB gadgets quit working to start with, however different issues may happen, (for example, surprising reboots). More than 5.25V and there is a danger of harm to the Raspberry Pi.

The power supply should have the capacity to supply a running current of around 300mA for the model A or 700mA if utilizing a model B. This is the primary reason that the model An is more qualified for this undertaking, to diminish the load on the power supply. The engines provided with the entertainer chassis are intended for a most extreme of 6V. On the off chance that we factor in the voltage drop inside the electronic circuit then in a perfect world it must to have a higher power supply. While we haven't settled on the best way to switch the engines yet you could consider around 1 volt voltage drop in the hardware. So we should to in this manner be searching for a power supply of around 7V, which is

required to run the motors at full power. Through testing we have discovered that the specific engines we have will keep running on a 5V supply even with our control hardware. In the event that utilizing 5V the engines will keep running with less power than if the supply to the engines is 6V, however in tests it was appeared to be adequate for moving the robot around on a generally level surface.

4.1.3 CONNECTING THE POWER:

Power is ordinarily given to the Raspberry Pi utilizing a miniaturized micro-USB connector, however the power connector on the battery holder is given as 2.5mm DC plug. An elective method to interface the power supply to the Raspberry Pi is through the GPIO connector.

4.1.4 CONNECTING THE BREADBOARD TO THE RASPBERRY PI GPIO:

The GPIO port on the Raspberry Pi is a 40 - way male header connector on the edge of the board.

The individual pins can be associated direct to the breadboard utilizing male-to-female jumper drives, which is the least expensive way, however we utilized a Raspberry Pi breakout shoemaker board. The cobbler board is a little PCB with a 40 - way connector that matches the one on the Raspberry Pi GPIO. A strip link is utilized to interface between the GPIO on the Raspberry Pi and the shoemaker. It is imperative to interface the lace link the right route around, on the cobbler there is ordinarily a hole in the connector lodging to guarantee the link must be embedded one path around, yet the Raspberry Pi GPIO does not have that extravagance. Pin 1 is set apart on both the Raspberry Pi and the cobbler and the lace link should to be situated so wire number 1 (regularly hued red) lines up with pin 1 at the two ends.

One of the upsides of the cobbler is that it makes it simpler to evacuate the Raspberry Pi (which we discovered valuable when sharing a Raspberry Pi between the robot and a code we were running), yet additionally that it makes it less demanding to see the pin assignment on the breadboard.

The following is an outline of the GPIO connector demonstrating its distinctive pin references.

The numbers in the corner are the port numbers. These are numbered 1 to 40, numbered vertically from the upper right. Where there are two GPIO numbers this alludes to a change between update one and two of the Raspberry Pi, where a moment reference is indicated it alludes to a substitute utilization of the pin, (for example, I2C, SPI or serial correspondence).

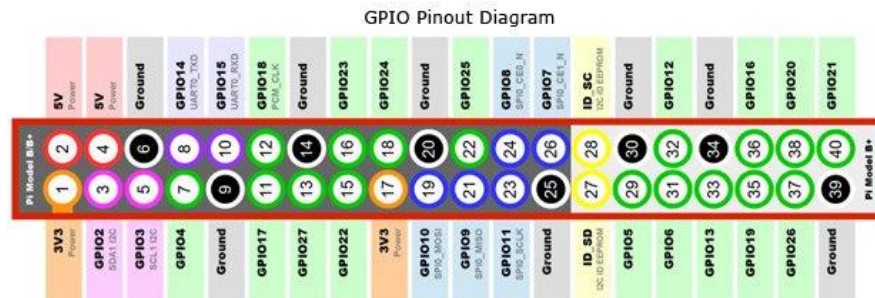


Fig. 4.1 GPIO Input Output Diagram

<https://www.raspberrypi-spy.co.uk/2012/06/simple-guide-to-the-rpi-gpio-header-and-pins/>

To give the power supply through the GPIO then any of the GND and 5V pins can be utilized. For this situation we have utilized pin 2 for the 5V supply and pin 39 for the ground association. We initially associated the power supply to the power rails on the breadboard and after that associated from those to the proper pin on the GPIO port.

4.1.5 ELECTRONIC CIRCUIT:

Since we can control the Raspberry Pi from the batteries we can take a gander at the gadgets required to drive the engines. As we have effectively expressed it isn't conceivable to control the engines straightforwardly from the GPIO ports. Right off the bat the GPIO can just supply 3.3V output though the engine is intended for 6V, yet in addition the measure of current that can be provided through the GPIO would be just a small amount of what we really need to run the engine.

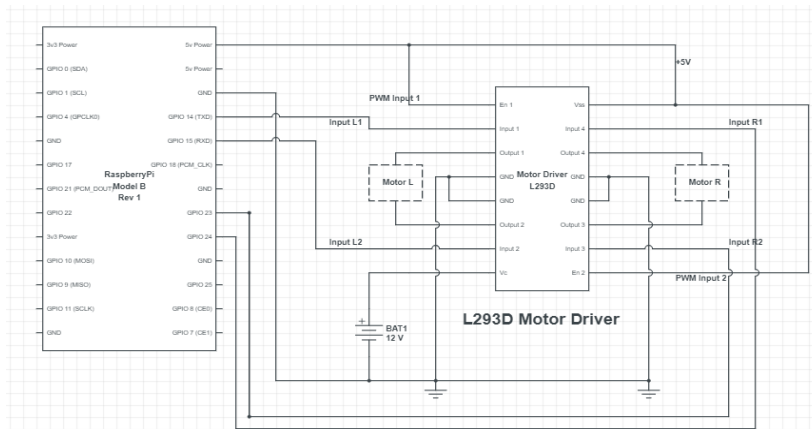


Fig 4.2 Connection of L293D and Raspberry pi Board

4.1.6 H-BRIDGE MOTOR CONTROLLER:

Before we get to the genuine circuit (which is really basic) here is a portion of the concept of how an motor controller functions.

The motors provided are fundamental DC motors with worked in gears. These sort of motors have just two wires which are for the power. The direction of the engine is dictated by the course of the current through the motor, so by turning around the positive and negative supply we can roll out the motors improvement direction.

4.1.7 BREADBOARD DESIGN:

The breadboard is connected onto a breadboard (solder-less prototyping board).

This first layout is where the is a separate power supply connected to the Raspberry Pi to the one used for the motors. The power to Vcc1 on the bridge IC is taken from the 5v pin on the GPIO connector and so is powered from the Raspberry Pi. The breadboard is associated onto a breadboard (patch less prototyping board).

This first design is the place the is a different power supply associated with the Raspberry Pi to the one utilized for the engines. The ability to Vcc1 on the bridge IC is taken from the 5V pin on the GPIO connector as is powered from the Raspberry Pi.

4.2 SOFTWARE DESIGN:

4.2.1 Connect a raspberry pi to pc

The Raspberry Pi can be related with a PC using a standard Ethernet connect. Regardless outline the SD card and a while later it should to be implanted in the opening on the Raspberry Pi. Finally insert a scaled down scale USB control supply (used for most PDAs) into the power connection and the NOOBS initially start screen will appear on the screen. Present the Raspbian working system which is the recommended choice (squeeze space) and after that press I to start the present. It will require a critical extend of time to repartition the SD card and present the working structure, after which it will restart with the Linux working system.

After the working structure boots out of the sudden the Raspberry Pi Software Configuration Tool will run (raspberry-arrangement). This contraption gives a menu which makes it more direct to features several highlights of the working system. We have recorded a fragment of the pleasing alternatives underneath:

4.2.2 Change User Password :

Prescribed to keep your system secure. The default username is pi and the mystery word is raspberry.

4.2.3 Enable Camera :

This is required if you have to use the Raspberry Pi camera module.

We can diminish the memory bit to 16MB and give an exceptional hostname to your Raspberry Pi. It is normally a smart idea to check for an invigorated shape likewise, yet that is simply possible when related with the Internet. When we have revealed the enhancements pick finish and after that reboot the Raspberry Pi. In the event that we need to reveal any enhancements to these in future you can dispatch the setup gadget by running `sudo raspberrry-arrangement`

4.2.4 Connect the robot to an existing Wi-Fi network

While we could arrange the Raspberry Pi to a present home remote framework this will infer that in case we expel the robot from home then it won't be possible to talk with the robot. We will likewise set-up the Raspberry Pi as a Wi-Fi hotspot. To do this we need to present some additional programming and for that we require a working framework

affiliation. We have a model B with an Ethernet port and have a wired framework switch supportive then we would interface be able to the framework direct to a switch and present the packs that way (in which case jump to the accompanying region on presenting additional programming). At first we need to modify the/et cetera/interfaces report which prompts the working structure how to arrange the system interfaces..

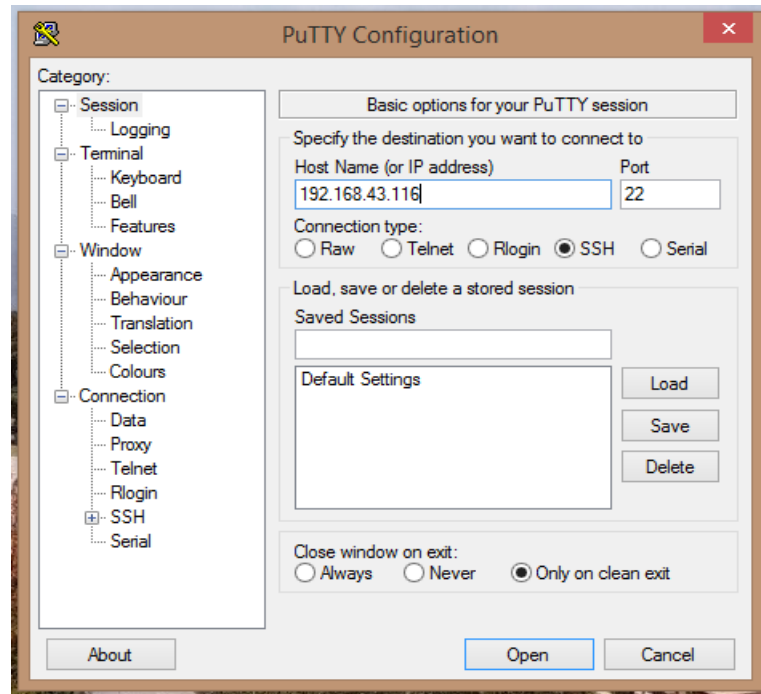


Fig 4.3 – Setting of IP address

We would now have the capacity to reconfigure the Raspberry Pi as a Wireless hotspot with the objective that we would interface be able to with the robot from wherever paying little respect to whether there is the same remote framework signal. This needs different particular frameworks organization to work. We will rapidly clear up each one as we incorporate it, yet it would be too much to illuminate each in detail.

4.2.6 Configure the static IP address

We now need to reconfigure the system with a static IP address. While it is conceivable to utilize a similar IP address run as we have on our current Wi-Fi arrange we can dodge some potential issues by utilizing an alternate system extend. This will help on the off chance that

you attempt and interface from a PC that is associated with our neighborhood organize (utilizing wired ethernet) and we are interfacing with the robot utilizing remote.

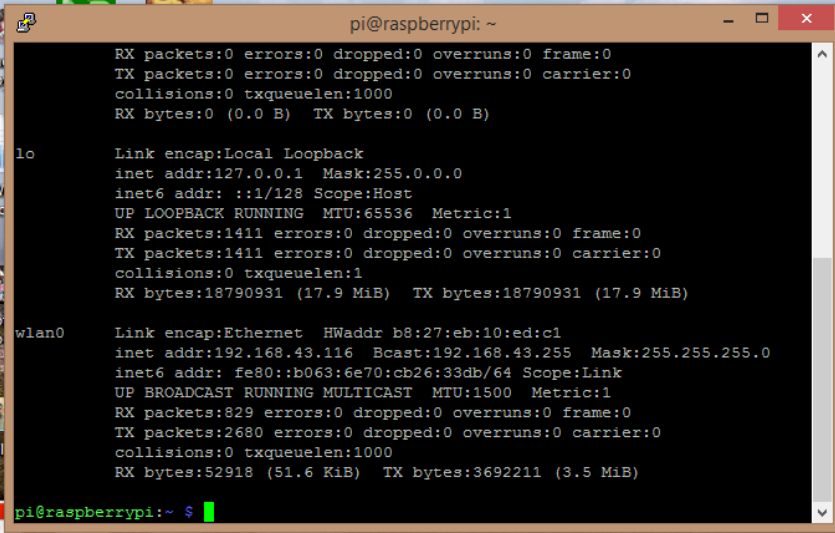
There are various system extends that are held for nearby utilize (odds are that your regularly remote system utilizes one of these reaches). We have picked the system 10.5.5.0/24 as this is less usually utilized. We will set the robot to 10.5.5.1 which is the primary usable IP address in that range.

```
sudo nano /etc/network/interfaces
```

Find the entry for the wireless LAN which we changed previously (wlan0).

Remove the iface wlan0 entry and the wireless network information and replace with:

```
iface wlan0 inet static
address 192.168.43.116
```



```
pi@raspberrypi: ~
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

lo    Link encap:Local Loopback
      inet addr:127.0.0.1 Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
      UP LOOPBACK RUNNING MTU:65536 Metric:1
      RX packets:1411 errors:0 dropped:0 overruns:0 frame:0
      TX packets:1411 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1
      RX bytes:18790931 (17.9 MiB) TX bytes:18790931 (17.9 MiB)

wlan0 Link encap:Ethernet HWaddr b8:27:eb:10:ed:c1
      inet addr:192.168.43.116 Bcast:192.168.43.255 Mask:255.255.255.0
      inet6 addr: fe80::b063:6e70:cb26:33db/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:829 errors:0 dropped:0 overruns:0 frame:0
      TX packets:2680 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:52918 (51.6 KiB) TX bytes:3692211 (3.5 MiB)

pi@raspberrypi:~$
```

Fig 4.4 – Configure the Raspberry pi

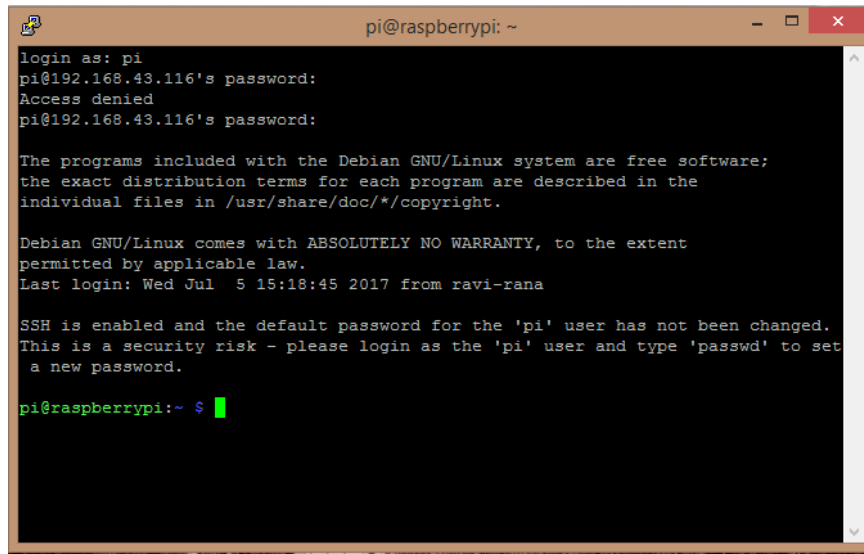
4.2.7 Logging on to the Raspberry Pi using SSH

Now that the Raspberry Pi has a working network connection it should be possible to remove the connections to the screen and keyboard and continue the rest of the configuration over the network.

The usual way of connecting to a Linux computer is using SSH. This uses a text based client that will run a shell on the “server”.

It allows us to run commands in the same way as we did for the configuration above, but across the network instead of needing to be on the Raspberry Pi. SSH is an encrypted protocol so that it is not possible for others on the network to see what commands are being issued and more importantly the username and password used to login.

We can get an ssh client for most computers, including tablets and smart phones.



```
pi@raspberrypi: ~
login as: pi
pi@192.168.43.116's password:
Access denied
pi@192.168.43.116's password:

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Jul  5 15:18:45 2017 from ravi-rana

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.

pi@raspberrypi:~ $
```

Fig 4.5 Logging a Raspberry pi

We have now build the hardware including the electronic circuit to control the motors. What we now need is the software to make it work. Before we start writing the software then we need to determine what we expect it to do and how it should do it. We are creating a formal project then this is normally done through a formal software requirements specification (SRS). The software requirements specification doesn't explain how the software is to be written, but should provide a list of things that we need the software needs to perform to be successful. The detail of the specification depends upon the size of the software project, but it's always a good idea to think through the aims of the software before you start programming.

The software created is to provide the control of a robot vehicle based around the Raspberry Pi Ruby Robot. This software is intended as a demonstration of how the vehicle can be controlled, it can then be used as a basis for future development of a program with improved functionality. The software will allow a user to control the robot vehicle using

key-presses and will control the motors appropriately. It should allow change in speed and direction. Will need to run on the Raspbian operating system. It should be easy to understand the software so that it can be developed further. It must be able to control the motor controller through the GPIO ports.

4.2.8. Getting started with Python

Unfortunately we don't have the space or the time to provide a comprehensive guide to learning Python. What we will do though is to consider how we can write the python code on the Raspberry Pi and an explanation on how it works.

The next thing is how to get the code onto the Raspberry Pi mounted in the robot vehicle. We can either do this by plugging a screen, keyboard and mouse onto the Raspberry Pi (which is mounted on the vehicle) or we can use our network connection to program or transfer the program to the Raspberry Pi remotely. We will use second, but programming remotely can make it easier to make quick changes to our program when testing.

So after logging in on the command line run **startx** to get to the desktop.

We will use the IDLE programming environment which provides a graphical editor as well as a Python shell that can be used for testing the code. It also provides syntax highlighting, which means that certain words will be displayed in different colours to make programming easier. Depending upon your preference start either IDLE or IDLE3 for Python 2.7 or Python 3 respectively.

IDLE starts with a python shell. We can enter python commands straight into the shell and see how the command works, but to add this program choose File→New to create a new file.

4.2.9 Programming the GPIO with Python

One of the reasons for choosing the Python programming language one the existing modules which make accessing the GPIO port easy to code. The RPi. GPIO module is included in the Raspbian image provided with NOOBs. This will explain how the GPIO code is going to work, but there is no need to enter this at the moment.

This is an initial program with basic functionality allowing the robot vehicle to be controlled using simple key presses.

4.3 WEBCAM SETUP:

4.3.1 Connect and Check USB Webcam

Most importantly, you have to check if your webcam is getting identified in the raspberry pi and whether its sustain can be seen. For this, to begin with, run the order "lsusb" in the terminal of the raspberry pi. This demonstrates to you a rundown of all the USB associated gadgets on the pi. Discover, from the rundown if your webcam's name or programming is shown. Next, we have to check whether you can see the nourish from the webcam on the pi. For this utilization "album/dev" to go to/dev index. Next, utilize "ls" to list its substance, check if "video0" is available.



Fig-4.6 Raspberry Pi with USB webcam and Wi-Fi dongle

Presently, you need to utilize an administration called ffmpeg to see the encourage from the webcam on the screen associated with the pi. Use "sudo well-suited get refresh" to refresh records. To introduce ffmpeg benefit, utilize these charges:

```
sudo apt-get install ffmpeg ffplay -f video4linux2 -framerate 15 -video_size 320x240 /dev/video0
```

The second charges start up the video having an edge rate of 15fps utilizing the video4linux2 mode, having a determination of 320x240 and utilizing the gadget from/dev/video0. When you run it, you will see the webcam feast upon the screen.

4.3.2 Video Streaming through Webcam

Here, the video from the raspberry pi is communicated on the neighborhood arrange. Any gadget on this system can see the video from the webcam. To do this, you have to first introduce the mjpg streamer. Utilize these commands to introduce it:

```
sudo apt-get install libv4l-dev sudo apt-get install libjpeg8-dev sudo apt-get install subversion sudo apt-get install imagemagick
```

Next, to run this administration and to start gushing utilize the following commands:

```
jpg_streamer -i "/usr/lib/input_uvc.so -d /dev/video0 -y -r 640x480 -f 10" -o "/usr/lib/output_http.so -p 8090 -w /var/www/mjpg_streamer"
```

- -I input module parameters
- -d speaks to the video gadget
- -y empowers YUV organize, debilitates MJPEG
- -r indicates the determination
- -f is the edge rate
- -o yield module parameters
- -p indicates the port number
- -w indicates yield webserving catalog

Presently your raspberry pi has begun broadcasting the video. Here, alter the IP address "192.168.1.9" with the IP address of your raspberry pi. You can discover it out by utilizing the charge "ifconfig" on your pi. At long last, utilize your program to open this HTML document and view the video. For gadgets, as iPad, and so on utilize any record supervisor applications to open the HTML document.

5. FURTHER EXPANSION

The market for purchaser and office robots will develop at a CAGR of 17% in the vicinity of 2014 and 2019, seven times speedier than the market for assembling robots.

The purchaser/office robot advertise is right now drove by three particular classifications: home cleaning and support, "telepresence" (i.e., working from home to occasions or remote workplaces), and propelled robots for home excitement. The omnipresence of cell phones and tablets has made it less demanding to create robots for buyer and office applications.

In 2015, robot deals expanded by 15% to 253,748 units, again by a wide margin the largest amount at any point recorded for one year. The primary driver of the development in 2015 was the general business with an expansion of 33% contrasted with 2014, specifically the gadgets business (+41%), metal industry (+39%), the compound, plastics and elastic industry (+16%).

China has significantly expanded its leading position as the biggest market with a share of 27% of the total supply in 2015.

4.1 Space Robotics:

The examination region Space Robotics manages the advancement of astute robots for extraterrestrial investigation concentrating on:

- Development of robot frameworks for unstructured, uneven landscape in light of naturally roused creative velocity ideas.
- Development of multi-utilitarian robot groups usable for various errands extending from insitu examinations to the association and upkeep of framework. Reconfigurable frameworks for planetary investigation.
- AI-based strategies for self-sufficient route and mission arranging in obscure landscape
- Image assessment, protest acknowledgment and territory demonstrating
- AI-based emotionally supportive networks for logical investigations

4.2 Underwater Robotics

This area manages the improvement and realization of Artificial Intelligence techniques in underwater systems. Principle purposes of research are:

- Development of system for client support in remote-controlled submerged vehicles used virtual submersion strategies
- Design of strategies for autonomous control and mission assembling of robot arms in underwater applications, especially with cutting edge sensor innovation, for example, "Visual Servoing"
- Image assessment and protest recognition with modular and intelligent underwater cameras
- Design of control strategies for next generation self-ruling underwater vehicles

4.3 Search and Rescue (SAR) & Security Robotics

Here, robots will be created to help protect and security work force. Fundamental purposes of our exploration are:

- Development of profoundly versatile stages for indoor and open air applications
- Development of self-ruling frameworks that can distinguish potential casualties (SAR) or gatecrashers (Security)
- Development and use of best in class sensor innovation in view of radar, laser scanner, and warm vision to distinguish items and people, resp.
- Embedding of robot system into existing salvage and security purpose
- Autonomous route and mission arranging

4.4 Robotic Painting

The way toward painting an auto body with modern mechanical arms isn't new, yet it is as yet an essential application to feature. Actually, since exceedingly qualified painters are elusive nowadays and thinking about the measure of an auto, it is substantially less demanding for an organization to utilize robots for this application. Furthermore, painting is an extremely complex process, it's diligent work and harmful, and also requiring predictable outcomes all through the entire generation. Another extraordinary part of utilizing an artistic creation robot is the lessening of waste material. Since the robots are outfitted with a flowmeter, precisely the same of paint is circulated on each part

6. APPLICATIONS

There are many applications of raspberry pi such as robotics arm management exploitation pi supported smart phone, android phone and wifi, vehicle speed detection by exploitation pi, autonomous camera primarily based eye controlled, wheelchair system, an internet of things approach for motion detection, real time vehicle , web primarily based automatic irrigation system, a custom web of things aid system bluetooth communication, interface with the raspberry pi system through android application, low price sensible security camera capability exploitation raspberry pi and open-cv , object trailing and autonomous mechanism , design of tracked mechanism with device for police investigation , raspberry pi and image process primarily based electronic voting machine (evm) , remote control of a domestic instrumentation , design and development of a mobile , android application supported raspberry pi card, etc

7. CONCLUSION

Mainly our main motto is to move a robot wirelessly. This robot can be used in any of the areas of the world but it requires a wifi connection. The code used in moving this robot is basically a python code which makes it easier to work. Logic convertor can also be used in changing voltage from a specific value to a desired value. For monitoring any particular area video surveillance is used . It has a lot contributing nature in military applications. To keep an eye on the enemy these kinds of robots are very useful ,also in those areas where it is not possible for humans to go robots can play a vital role there. Also it is not easy to deployed these kinds of robots in areas where there is accessibility. These kinds of robots can be controlled by GUI (Graphical user interface). As the robot is containing a camera which can copy the images and finally it will send to the related server by which the user can control the live feedback. Wireless robot has a number of application in where human reach is quite difficult such as safeguarding a particular ground, keeping a check on social media etc. Also these robots can work on themselves and accordingly work on particular aspect. That is the beauty of this project.

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